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NUTRITION AND DENTAL HEALTH

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There is relatively little disagreement as to the immediate etiological factors in the production of dental caries. It is generally held that dental caries is the direct result of local environmental factors. However, predisposing factors apparently alter the degree of individual susceptibility.

Such factors may include morphology and composition of the teeth, salivary composition and nutritional status of the individual. Post-natal nutrition, prior to completion of formation and eruption of the teeth, undoubtedly affects their composition, as does pre-natal nutritional status. Influence of specific nutrients upon the formation and calcification of dental tissues has been investigated by numerous workers. However, influence of the child's nutritional status upon dental health following completion of formation and eruption of the teeth has been largely conjectural.

Without question, restriction of intake of refined carbohydrate results in a decreased caries rate. The form in which sugar is eaten, influencing the rate of clearance from the mouth, likewise has an effect upon the caries rate. The mechanism is a modification of the local oral environment, with resultant change in susceptibility or immunity. It is similar in nature to toothbrushing which changes the environment on and around the teeth.

Various studies have been conducted to determine the influence of specific nutrients upon tooth formation and subsequent resistance to dental caries. Early studies dealt with the intake of calcium and vitamin D. From them it was concluded that maternal diets deficient in calcium and vitamin D resulted in poorly formed enamel and dentin. Their hypoplastic defects predisposed to the development of dental caries. Later studies have indicated that dietary supplementation of calcium and phosphorus during pregnancy does not promote development of teeth which necessarily will be caries resistant.

Experiments have demonstrated the detrimental effect of vitamin A deficiency on the formative tissues of the teeth. No conclusive evidence has been presented, however, to indicate that vitamin A deficiency during tooth development caused an increased susceptibility to dental caries. Similar conclusions have been reached with the vitamin-B complex and vitamin C.

The influence of dietary factors, other than carbohydrate, on the incidence of dental disease during the period after tooth eruption, has not been as thoroughly studied. Previously it has been held that enamel is not affected by metabolic processes after formation of the teeth. Conclusions based on studies utilizing the electron microscope and radioisotopes now make this concept untenable. Studies have shown that the dental structures are capable of ionic transfer from the blood stream or the saliva, even after completion of tooth formation and eruption. In fact, it has been postulated that caries development may represent an unfavorable ionic balance between the tooth surface and the local environment.

Conceivably mineral supplements may exert a caries-inhibitory action on a systemic basis, or caries-inhibitory effects of such supplementation may result from mineral contact with the enamel surface. It is of interest that dibasic sodium phosphate added to the diet of laboratory animals has resulted in a significant inhibition of caries.

Persons ingesting diets containing appreciable quantities of starches and sugars tend to have a high incidence of tooth decay. Individuals subsisting on diets consisting primarily of protein and fats usually have minor caries involvement. It has been suggested that inhibition of acid production in the mouth may be the result of local protein putrefaction. Recent studies, however, suggest that the deficiency of an amino acid, lysine, in the diet may affect the susceptibility to dental caries. In an experiment in which lysine was given by stomach tube and by intraperitoneal injection, the incidence of caries was reduced. This supports the theory that erupted, fully formed teeth may be influenced by systemic factors.

Dr. Wessels

In a study by the Department of Pedodontics, University of Iowa, and the Department of Foods and Nutrition, Iowa State University, effort was made to determine the effect of changes in the amount of protein, fat and carbohydrate in the diet, on the incidence and progression of dental caries in a group of 150 girls, ages eight to fourteen. The study extended for 31 months, with repeated dental examinations. The subjects were divided into two groups equated for age and physique. Both groups exhibited similar caries characteristics at the beginning.

For over nine months, the experimental group received a dietary supplement consisting of concentrated milk with vitamins A and D, and foods with abundant vitamins A and C, such as carrots and tomato juice. The control group received a supplement providing only small amounts of nutrients. The experimental group consistently consumed more protein and fat. There was a difference of only three percent in carbohydrate consumption between the two groups.

(Continued on Page Two)

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Glances AT NUTRITION RESEARCH

Good nutrition is important especially during the period of dental development, but dietary and nutritional wisdom are vital for good teeth and for healthy supporting tissues throughout life.

Dairy Products And Caries—Individual dairy products and mixtures thereof were used in two experiments with 669 rats of the Harvard caries-susceptible strain. The dairy foods were used to supplement a cariogenic regimen to observe their post-eruptive and developmental influence. On a post-eruptive basis, all supplementary dairy products reduced the incidence of dental caries. The dairy foods were substituted for part of the cariogenic, but otherwise adequate, diet of the mothers during pregnancy and lactation and, during development of the teeth, did not influence caries susceptibility.

Shaw, J. H., Ensfield, B. J. and Wollman, D. H. *Studies on the Relation of Dairy Products to Dental Caries in Caries-Susceptible Rats. J. Nut. 67:253 (Feb.) 1959.*

Dental Surveys And Nutrition—In a series of dental surveys, physical biochemical and dietary observations were made along with studies of periodontal status to establish a possible relationship between the two. Examinations were made of population groups in Alaska, Ethiopia, Peru, Ecuador and Vietnam. At the time of writing this report there were apparent no consistent patterns of association between nutrition and oral status. Analysis of the data continues. In the consideration of dental caries an investigator meets difficulty in relating a lifetime of dental history with present nutritional state.

Russell, A. L., Littleton, N. W., Leatherwood, E. C., Sydow, G. E. and Greene, J. C. *Dental Surveys in Relation to Nutrition. Public Health Reports 75:717 (Aug.) 1960.*

Diet, Nutrition And Calcium Phosphate—Diet affects dental surfaces and gingival tissues in a local and direct manner. The texture of foods and the nature of dietary debris determine their potential for damage. Degradation products of carbohydrates and bacterial enzymes present in the mouth are important in caries development while the effects of these on periodontal tissues are not well understood. It is noteworthy that diabetes and nutritional deficiencies have adverse effects on gingival tissues and the addition of calcium phosphate to rat rations reduces the incidence of caries. A great deal of study is waiting to be done particularly on the biochemical aspects of these problems.

Johansen, E. *Nutrition, Diet, and Calcium Metabolism in Dental Health. Am. J. Pub. Health 50:1089 (Aug.) 1960.*

Eating Habits And Caries—In the spring of 1956, 783 pre-school children aged 62-78 months, of West Tennessee, were studied to determine the general between-meal eating patterns, the types of items eaten most frequently and the relationship between the frequency of eating specific snack items (chiefly refined carbohydrates) and caries experience. The average frequency of between-meal eating was 1.75 items per day with the four most popular items, in descending order, being gum, candy, soft drinks and pastries. The frequency of consumption of high-sugar adhesive items was related directly and consistently to caries experience.

Weiss, R. L. and Trithart, A. H. *Between-Meal Eating Habits and Dental Caries Experience in Pre-school Children. Am. J. Pub. Health 50:1097 (Aug.) 1960.*

Editor's note: Because the subject of nutrition and dental health is of major interest, Dr. Wessel's report is being continued in the space usually devoted to Timely Topics.

(Continued from Page One)

In comparing caries increment in the two groups during the study, an increase of 85 percent was found for the experimental group and a 110 percent increase for the control group, a difference which was statistically significant.

There was some degree of association between low caries and high protein intake, and low caries and high fat intake. There was an insignificant association between low caries and low carbohydrate ingestion.

It would seem that it is possible to decrease or inhibit dental caries progression by increasing the level of protein and fat in the diet. However, the experimental group received a supplement rich in nutrients in addition to protein and fat, so it is impossible to rule out the beneficial effects of a better general level of nutrition.

This study suggests further clinical investigation of the influence of nutritional factors on caries incidence and progression. There is need for a method for over-all dietary appraisal to investigate more thoroughly the relationship between nutrition and caries progression in the clinical situation.

Dr. Kenneth E. Wessels was formerly professor and head of the Department of Preventive Dentistry and Pedodontics at the University of Iowa, Director of the University Children's Dental Clinic, clinical professor of Pediatrics in the College of Medicine and Chief of the Dental Section of the Iowa Hospital School for Handicapped Children. He is presently assistant secretary of the Council on Dental Education of the American Dental Association.

THE STUDENT COUNCIL HAS A FOOD COMMITTEE

By Mrs. Lois Richards, Dietitian
Illinois Children's Hospital-School, Chicago, Illinois

Food has a profound meaning for each of us, a meaning which may have little bearing on its nutritive value. It involves us with other people and may be interpreted as evidence of interest or disinterest in our welfare.

"The students in my dining room don't want liver served any more!" says Bill as he leans on his crutches. "Oh, there are students who like it. In fact, I learned to like it right here at I.C.H.S.," answers Jim, an older student from Bill's residential floor. Sandy adds to the discussion, "In health class we learned that liver is high in food value, just what our dietitian tells us. It should be on the menu. Maybe those who think they don't like it will learn to like it. Let's ask that liver not be served quite as often for a while?"

And so goes a typical discussion of the Student Council's Food Committee at the Illinois Children's Hospital School. This State of Illinois Department of Public Welfare Institution is a residential center for educable children with severe orthopedic handicaps. Its three-fold goal is to rehabilitate the child physically to the extent possible, to afford him the educational advantages accessible to the normal child, and to help him acquire the art of gracious living through social experience. In each of these areas—rehabilitation, education and social growth—the dietitian has a unique role as the staff adviser to the Food Committee.

The constitution of the I.C.H.S. Student Council outlines the duties and functions of the Committee. "During the fall meeting, which is held at the beginning of the school year, the president shall appoint a food committee of two members from each of the four residential floors. He should give preference to students who volunteer for such service, within the existing rules of such committees.

"At the first meeting of each committee, the members shall elect a chairman and secretary. The elected chairman of each committee shall give a full report at each General Assembly. He shall also report to the president of the Student Council preceding each monthly meeting. Vacancies in the committees shall be filled by appointment by the Student Council president.

"The purpose and duties of this committee shall be:

1. To meet with the dietitian once every two weeks during the school year.
2. To give criticism and suggestions concerning the food served to the students.
3. To promote cooperation and understanding between students and dietary staff."

The committee meets every other week unless a holiday interferes. One meeting is held after school in the library and the next is a dinner meeting held in the staff dining room. Notices of meetings are sent to each member and to staff. The chairman, following parliamentary procedure, calls the group to order. The secretary reads the minutes of the last meeting. The chairman then asks each member for the reports from his residential floor.

The younger children usually want to know when hot dogs or hamburgers are going to be served or ask such questions as "Why can't we have more chocolate ice cream?" The older students comment on all phases of food service and dining room operation. Their opinions are valued highly by the dietitian and the dietary staff. The reports give the dietitian opportunity to explain and interpret the menu and dietary service to the group. After the meeting is adjourned the committee members take the information back to the other students.

Over the years the Food Committee has proven its effectiveness in creating constructive attitudes regarding foods and their importance in our daily living. It has served as an important channel of communication between students and staff. It has provided the means for free expression of opinion in an area vital to all children but particularly those in an institutional setting.

A challenge in working with children living outside of the home is provision of experiences that approximate as closely as possible those they would ordinarily have as a member of a family group. Through the Food Committee, the children have learned to give suggestions, to respect the food preferences of others, to understand some of the problems in planning and preparing meals for groups of people.

As Bill walks up the hall, he is heard telling Jim, "Well, it looks like we'll still have liver served, but at least we'll have chocolate ice cream next week."

A COOPERATIVE DENTAL HEALTH PROJECT

By Frank Hughes, D.D.S., Past President
Indianapolis District Dental Society, Indiana

The scene is a centrally located downtown hotel in Indianapolis on a day in February during the 1960 Children's Dental Health Week. The players are pre-school children, children in kindergarten and grades one through six, their parents and members of the dental profession. The action, as in any finished production, culminates many months of planning.

This is a report on how two very different community organizations cooperated in the planning and execution of the action unfolding in the downtown hotel. The cooperating organizations were the Indianapolis District Dental Society and the Promotion Division of the Downtown Merchants Association of Indianapolis.

It began with an idea and a question. How could two organizations—one whose prime purpose is to maintain high ethical standards of a profession and one whose prime purpose is sales promotion—work together in an educational project? Although different in purpose, both could accomplish something by cooperation on such a project. It would enable the Dental Society to call wider attention to the children's dental health story. It would enable the merchants to bring individuals to the shopping district and contribute to a community health project.

Efforts at dental health education, important as they are, frequently meet with seeming disinterest and unconcern. But, the first step in getting people to accept new ideas is to get them to know that a problem or idea exists—to create awareness. The Dental Society recognized that a campaign-

(Continued on Page Four)

—that there are about eighteen distinct types or kinds of natural cheese? All the rest (more than 400 names) are of local origin, usually named after towns or communities.

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—that families with heavy expenditures for health are generally larger in size and have higher incomes than average, and a higher-than-average proportion of their health spending is covered by voluntary health insurance?

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—that for centuries, the Balkan peoples have enjoyed fermented milk and Central Asiatic tribesmen a sour, alcoholic mare's or camel's milk called kumiss?

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—that according to a recent report, average life expectancy in this country has increased by more than 22 years during the present century? The average baby born in 1900 could expect to live only 47.3 years, against 69.7 years for one born in 1959.

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—that vitamin A was designated as an essential nutrient in butterfat in 1913 by E. V. McCollum?

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—that in 1960, for the first time since the National School Lunch Program was established in 1946, over 13.5 million youngsters are participating, according to the U. S. Department of Agriculture?

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—that George Washington enjoyed ice cream in private life but it was Dolly Madison who created a pleasant furor by introducing ice cream at a White House reception?

THINGS YOU'LL LIKE TO READ

Dental Health Education—Stoll, Frances A. 2nd Ed. Philadelphia: Lea and Febiger. 1960. $5.50.

This book brings together a wealth of information on which to base a dental health program. It is written for classroom teachers, dental health educators, dentists, and dental hygienists in school and public health programs. The text presents dental health education as an integral part of community living, relates dental health instruction to the principles of child growth and the learning process, and provides authentic information and sources for dental health teaching, including instructional materials.

The Safe and Sure Way to Reduce—Maddox, Gaynor. New York: Random House. 1960. $3.95.

The author, a food and markets editor, has very adeptly translated the results of much recent scientific research on weight reduction and weight control to easy-to-read and easy-to-use information. The main objective in the book is to counteract "crash diets" and "fad diets" with easy-to-follow diet plans based upon familiar foods. Seven-day low-calorie menus using meat, bread and cereals, and dairy products, and others using fresh, frozen or canned foods make up more than one-third of the book.

A COOPERATIVE DENTAL HEALTH PROJECT

(Continued from Page Three)

type program, while limited in educational value, could serve as a catalyst for stimulating interest in dental health.

The general purpose of the project was to promote children's dental health in the Greater Indianapolis area with specific objectives of conducting a smile contest, providing dental consultation, and making children and their parents aware of the importance of good dental health. The Dental Society assumed responsibility for planning and organizing the program.

More than 50 professional and lay people representing the sponsoring organizations, Dental Society Auxiliary, Indiana State Board of Health, Health and Welfare Council of Indianapolis and Marion County, schools, dental supply houses and private business worked on the steering committee and special subcommittees. Subcommittees arranged for the smile contest, consultation clinic, schools promotion, speaker's bureau, public information, special banquet and professional conduct.

The nucleus of the program was the special consultation clinic set up during Children's Dental Health Week. Here each child was given a mirror and explorer examination. The dentist discussed his findings with the parent, answered questions and made suggestions for improvement.

Children who met the criteria for the smile contest were sent to a finalist unit. Others were sent directly to an educational unit. All children and their parents eventually reached this unit where they watched a toothbrushing demonstration, a story animated on a flannel board and a dental health education film.

The smile contest was a device used to promote the clinic. First prize—an expense-paid trip to Disneyland for the winning child and one parent—was of sufficient appeal to encourage participation in the entire program. The grand finale was a banquet to honor winners of the smile contest and to express appreciation to all participants.

The success of a program such as this depends on the enthusiastic support by dentists and the public. So there were concentrated efforts to disseminate information about the campaign—telephone calls, a calendar of events, a memo describing the program, spot announcements on radio and television, special news releases, personal appearances on radio and television, personal delivery of dental health week posters and invitations to the smile contest.

The program was a success. It helped make the community aware of the importance of dental health. It demonstrated that community organizations can work together, even though their functions are vastly different, with each accomplishing more than it could have alone. After the curtain had fallen on the 1960 project, plans for 1961 were underway. Today they are in action.